ITT-557-A

CERTIFICATION

To whom it may concern:

This is to certify that the attached translation from German into English is an accurate representation of the document translated by the undersigned. This document is designated as:

Patent for: **GALVANIZING DEVICE**

The undersigned declares that he is fluent in German and standard North American English and qualified to translate and attests to the following:

"To the best of my knowledge, the accompanying text is a true, full and accurate translation of the specified document."

Ian Findlay

Date: September 11, 2003

Title: Galvanizing Device

Description

The invention relates to a galvanizing device having at least one jet cell through which a work piece to be galvanized, for example, a brake line or similar, is conducted, having a contact zone located after the jet cell in the direction of transportation and at least one partition separating the jet cell from the contact zone and a seal surrounding the work piece which is located between the partition and the jet cell.

In the galvanizing process, electrically conductive liquids (electrolytes) are used in which the work pieces are immersed and in which said work pieces are covered with a metal coating. Aqueous, acidic or alkaline solutions are employed as electrolytes. The anodes consist mostly of the metal to be precipitated. A zinc electrolyte is employed in the zinc coating of metal, for example. The work piece is immersed in the electrolyte and attached to the negative pole (cathode) of a direct current. A soluble zinc anode (positive pole) is immersed in the bath at the same time. Under the effects of the direct current, the split salt molecules separate, depending on their charge. The positive zinc ions migrate to the negative pole, the work piece, and are deposited there. The coating is created on the work piece through reduction (electron absorption) of the positive zinc ions. At the same time, the anode gives off zinc ions to the solution, whereby said anode slowly dissolves. The negative sulphations give off their charge at the anode.

Not only metallic (conductive) work pieces can be coated in this way, but also plastics. For this they are chemically metallized, i.e. made conductive. The range of uses is wide: household objects, sanitary articles or motor vehicle components, for example, brake lines can be coated.

Brake lines, for example, are zinc-coated in a galvanizing device with high-speed zinc deposition. Jet cells, in which the galvanizing process takes place, are now used as the core of the device. The tube to be galvanized is passed through these

jet cells. In addition, zinc electrolyte is pumped through these jet cells at high pressure. A contact zone, by means of which electrical contact is made with the tube, is located between each jet cell section, separated by one or two partitions. The contacts are cooled by means of a coolant circuit. This coolant circuit must be kept separate from the zinc electrolyte circuit. The seal for this is provided between the jet cells and the contact zone by means of plastic stripper plates. These plates are placed over the tubes so that the tube passes through the plates, whereby the electrolyte adhering to the outside of the tube is stripped off. It has turned out to be disadvantageous that the stripper plate touches continuously along the surface of the tube, causing wear on the stripper plate and permanently enlarging the opening through which the tube passes, so that the seal can no longer be guaranteed after a short while.

It is therefore the object of the invention to prepare a galvanizing device in which less electrolyte is entrained and in which the service life of the seal is longer.

This object is achieved in accordance with the invention with a galvanizing device of type named at the beginning in which the seal is provided at the outlet of the jet cell.

This has the considerable advantage that the outside of the tube is cleaned of adhering electrolyte directly at the outlet of the jet cell and the tube, cleaned of electrolyte, covers a specific distance until it passes through the partition toward the contact zone. Moreover, any electrolyte still adhering to the outside of the tube can be additionally removed in this way along this path. This would not be possible if the seal is positioned directly at the inlet of the partition, as in the prior art.

In an improved embodiment, the outlet of the jet cell is furnished with a pre-baffle surrounding the outlet. This effect of this pre-baffle is to slow down the stream of electrolyte issuing from the jet cell, and a majority of the electrolyte stream adhering to the tube, or outside of the tube, is stripped off.

In an improved embodiment, the pre-baffle acts as a mount for a seal. A seal is

installed in addition to the pre-baffle, which seal is attached to the pre-baffle, or is retained by the pre-baffle.

Under the invention, back-pressure is created in the pre-baffle which slows down the electrolyte stream leaving the jet cell. This has the advantage that the slowing down process occurs wear-free, thereby increasing the service life of the device.

The seal is advantageously formed by a stripper plate, which, since it is attached at the pre-baffle, is not subject to wear since it does not touch the galvanized tube. The opening in the stripper plate can be selected such that only a small gap to the work piece remains, so that almost all the electrolyte is stripped off. Entraining of electrolyte into the contact zone is thereby reduced to a minimum.

Overall, it can be established that, on the basis of the invention, electrolyte loss is minimal, wear at contacts, brackets and copper rails is similarly minimal, that environmental pollution is minimal because of the low wear and the low loss of electrolyte and that the consumption of chemicals is low. Further, there is no risk of blockage of the jet cells from worn stripper platelets. This also means that the jet cells enjoy a longer life. The expense of maintenance is similarly reduced, which lowers operating costs, to which the reduced wear on stripper plates contributes.

Additional advantages, features and details of the invention can be derived from the dependent claims and the description to follow, in which a particularly preferred embodiment is described in detail, considered in reference to the drawing. The aforementioned features revealed in the drawing, the description and in the claims can be essential to the invention, both individually in themselves or in any combination.

In the drawing:

Figure 1 shows a perspective drawing of several jet cells, a contact zone and a partition between them; Figure 2 shows an enlarged reproduction of a section II from Figure 1, showing the outlet of a jet cell with pre-baffle; and Figure 3 shows a perspective view of a pre-baffle.

In Figure 1, a total of three jet cells 10 can be seen which are located in a galvanizing bath 12. A zinc electrolyte flows through the jet cells 10 under high pressure. In addition, a work piece 16, specifically a brake line 18, is passing through each jet cell 10.

This brake line 18 is standing in a contact zone 20, in electrical contact with schematically represented cathodes 22, which are cooled by cooling water 24. A first partition 26 and a second partition 28 can additionally be identified in Figure 1, which separate the galvanizing bath 12 from the contact zone 20. Entrainment of zinc electrolyte 14 into the contact zone 20 is prevented by the partitions.

In Figure 2, which shows section II from Figure 1 in an enlarged rendering, the outlet 30 of the jet cell 10 can be seen, to which a pre-baffle 32 is attached. The pre-baffle 32 generates back-pressure for the zinc electrolyte 14 leaving the outlet 30, which is thereby slowed. The pre-baffle 32 additionally acts as a mount for a seal identified overall with reference numeral 34, which is formed by a stripper plate 36. This stripper plate 36 has an opening which is slightly larger than the outer contour of the brake line 18, so that zinc electrolyte 14 adhering to the outer circumference of the brake line 18 is stripped off without any contact. The brake line 18 is thus free of zinc electrolyte 14. Since the brake line 18 enters the first and the second partition 26 and 28 electrolyte-free, no zinc electrolyte 14 can be entrained into the contact zone 20.

It is also considered to be a further advantage that because the stripper plate 36 is mounted to the pre-baffle 32, the stripper plate 36 is precisely aligned to the brake line 18, so that they do not touch each other and consequently no wears ensues. The device in accordance with the invention has a long operational life and is

environmentally friendly.

How a pre-baffle 32 is used at the outlet 30 of the jet cell 10 is shown in perspective view in Figure 3. The pre-baffle 32 has essentially a cubic bowl shape, with one side missing. Two side walls 38 and 40 adjacent to it are furnished with openings 42 and 44 which serve firstly to attach the pre-baffle 32 to the outlet 30 of the jet cell 10, and secondly to allow the brake line 18 to pass through. The opening 44 is open at its edge so that the pre-baffle 32 can be snapped onto the outlet 30 without difficulty. The opening 42 is essentially slot-shaped so that the pre-baffle 32 can be pushed over the brake line 18. The width of the slot is slightly larger than the outer diameter of the brake line 18, so that entrained electrolyte 14 is for the most part held back. The stripper plate 36, which is held in position by the static pressure of the electrolyte, is placed against the inside of the side wall 38.